第 41 卷 第 1 期
2003 年 1 月

古 脊 椎 动 物 学 报
VERTEBRATA PALASIATICA

pp. 42～54
figs. 1～4

安徽嘉山晚古新世哺乳动物群[1)]

黄学诗

(中国科学院古脊椎动物与古人类研究所 北京 100044)

摘要 记述了在安徽省嘉山县土金山晚中新世地层中发现的 7 种哺乳动物化石,其中包括两个新种——翟氏肉齿兽?(*Sarcodon ? zhaii* sp. nov.)和原始皖柱兽(*Wanostylops promissus* sp. nov.)。这是目前为止有关嘉山土金山动物群最为全面的一次报道。动物群的性质表明含化石的土金山组的时代为晚古新世,很可能相当于格沙头期或稍早。

关键词 安徽嘉山,晚古新世,哺乳动物化石

中图法分类号 Q915.873

自 20 世纪 70 年代安徽省地质矿产局区域地质调查队在该省嘉山县土金山一带发现哺乳动物化石以来,中国科学院古脊椎动物与古人类研究所与安徽省区调队多次组织联合考察队赴该地进行深入调查,每次都有所获。然而现存化石虽不算少,但好的标本不多,除一件相当完整的中兽头骨和另一件被归入单门齿超目(Simplicedentata)的头骨已发表(Zhou et al.,1995;McKenna and Meng,2001)及另两件尚待研究的标本外,其余材料均相当破碎,以致这些化石的研究工作一拖再拖。最近笔者在整理这些标本时,发现它们拓宽了嘉山动物群的内涵,在分类上和确定地层时代方面均很有意义。本文即是迄今为止嘉山土金山晚古新世哺乳动物群的一次较为系统而全面的记述,计包括 5 目 6 科 7 种动物。

1 标本记述

鼩鼱目 **Soricomorpha Gregory,1910**

微翼齿兽科 **Micropternodontidae Stirton et Rensberger,1964**

肉齿兽属 Sarcodon **Matthew et Granger,1925**

翟氏肉齿兽?(新种) Sarcodon ? zhaii **sp. nov.**

(图 1;2-1)

正型标本 一左下颌骨断块附颊齿 m2 及 m1 的跟座(V 11358)。

产地及层位 安徽省嘉山县辛庄南 1km,晚古新世土金山组。

特征 一种下臼齿跟座比属型种 *Sarcodon pygmaeus* 狭窄的肉齿兽。

词义 种名赠给在安徽嘉山地区做过大量地层古生物工作、并将嘉山标本慷慨赠送给本文作者研究的我国著名地层古生物学家翟人杰教授。

描述 m1 只保存跟座,跟座上 3 个尖清楚,之间有切迹。下次小尖在横向位置上居

1) 中国科学院重点项目(编号:KZ952-J1-410)资助。

收稿日期:2002-03-07

中,与下次尖及与下内尖之间的距离明显短于下次尖与下内尖之间的距离。跟座呈盆形,在下内尖之前向舌侧开口。m2 保存完整,是一长形牙齿。三角座上 3 个尖大致等距,之间有明显的切迹。下原尖最高大、突出,下前尖似由下原尖前基部向舌侧伸,多少有点呈叶片状。跟座上的 3 个尖均很清楚。下次小尖高大而突出,位于牙齿的中部后方稍偏舌侧,与下次尖和与下内尖之间的距离均略大于下次尖与下内尖之间的距离。牙齿后壁无磨蚀痕迹。牙齿测量见表 1。

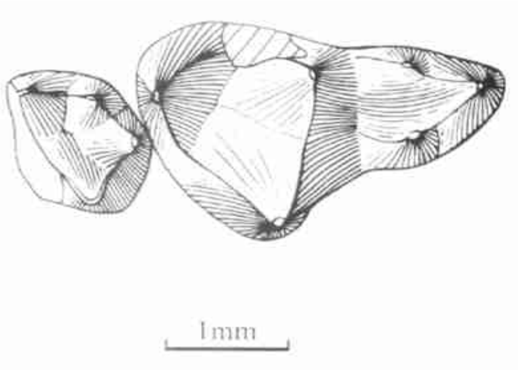

图 1　翟氏肉齿兽?(新种)的左 m2 及 m1 的跟座(V11358)

Fig. 1　Left m2 and talonid of m1(V 11358) of *Sarcodon ? zhaii* sp. nov.

比较与讨论　本文记述的完整下臼齿的下次小尖特别发育,明显大于前一臼齿中的

表 1　翟氏肉齿兽?(新种)的下臼齿(V 11358)测量与比较

Table 1　Measurements and comparison of the lower molars of Sarcodon ? zhaii **sp. nov. (V 11358)**　(mm)

	m1			m2		
	长 (L)	三角座宽 (TrW)	跟座宽 (TaW)	长 (L)	三角座宽 (TrW)	跟座宽 (TaW)
Sarcodon ? zhaii sp. nov.			1.25	3.05	1.90	0.95
Sarcodon pygmaeus *	2.85	1.70	1.50			
Prosarcodon lonanensis **	2.18	1.70	1.27	2.74	1.74	1.19

* 依 Szalay and McKenna,1971; ** 依 McKenna et al.,1984。

下次小尖,而且它与下次尖和下内尖之间的距离均大于下次尖与下内尖之间的距离,与前一牙齿中的情形完全不同,且牙齿后壁无磨蚀痕迹。由此可以推断这个牙齿应该是最后一个下臼齿。该牙齿的三角座和跟座形态与 *Sarcodon* 和 *Prosarcodon* 的最后一个下臼齿很相似,这两属都只具两个下臼齿(与 *Hyracolestes* 不同,尽管此属也仅具两个下臼齿,但其跟座上无下内尖),因此本文记述的完整牙齿很可能是 m2,前面只保存跟座的牙齿就是 m1。由于材料少,无法在这两属中做更多的比较。从大小上看,*S. pygmseus* 的 m1 明显比 *P. lonanensis* 的 m1 大。虽然前者没发现 m2,但按常规推测它的 m2 也应比 *P. lonanensis* 的大。嘉山标本 m2 的长和三角座宽均大于 *P. lonanensis*(表 1),似应接近 *Sarcodon*,故暂归入此属。该属目前只有一个种,*S. pygmaeus*,发现在蒙古晚古新世格沙头组中。本文标本与之相比,下臼齿跟座显得窄,与宽的三角座很不相称,因此可能是个新种。

偰鼠兔目　**Mimotonida Li et al.,1987**

偰鼠兔科　**Mimotonidae Li,1977**

偰鼠兔属　Mimotona **Li,1977**

偰鼠兔未定种　Mimotona **sp.**

(图 2 - 2)

标本为一残破的右下颌骨带齿冠破碎和磨蚀重的 p4～m2(V 11359)。下颌颏孔只见

到一个 ,比较大 ,位于 p4 三角座之下。第一下门齿仅在牙床底部见有断面 ,似较粗壮。位于 p4 之前下牙床上有 3 个齿槽 ,后两个(靠近 p4) 比较垂直齿槽缘 ,相互间平行(不像 p4 那样在底部分开) ,估计是 p3 的两齿槽。再前面的一个向前倾斜 ,与齿槽缘斜交 ,应是第二下门齿的齿槽。3 个颊齿在下颌骨上长得不规则 ,m1 比其余两牙齿明显靠外 ,是原来就畸形还是后来被扭曲 ,不得而知(很可能是错位) 。牙齿冠面上只后尖保存较好 ,比较高大。三角座和跟座之间的外侧沟已磨平或很浅。从具有双门齿判断 ,这块标本应属僕鼠兔。从下颊齿长度看 ,大小与发现在潜山盆地痘姆组中的粗壮僕鼠兔(*M. robusta*) 相近(李传夔 ,1977) 。由于保存太差 ,难以定种。牙齿测量见表 2。

表 2　模鼠兔未定种的下颊齿(V 11359) 测量

Table 2　Measurements of the lower cheek teeth of Mimotona **sp. (V 11359)**　(mm)

	p4	m1	m2	p4~m2	p4~m1	m1~m2
长(L)	1.6	2.0	2.2	6.0	3.6	4.0
宽(W)	0.6 *	1.4 *	1.6 *			

* 为近似值。

狉兽目　Anagalida Szalay et McKenna ,1971

狉兽科　Anagalidae Simpson ,1931

宣南兽属　Hsiuannania Xu ,1976

麻姑宣南兽　Hsiuannania maguensis Xu ,1976

(图 2 - 3~4)

材料有 :一左上颌骨断块带 M2 及齿冠破碎的 M1(V 11360.1) ;带 dp4 的左右下颌骨各一断块(V 11360.2~3) ;右下颌骨断块附 p4(V 11360.4) ;右下颌骨附 p4~m2(V 11360.5) 。

两个上臼齿内侧浑圆 ,单面高冠现象明显。M1 齿冠已完全破损。M2 冠面呈方圆形 ,前、后齿带尤其是后齿带很发育 ,构成牙齿的前、后壁。虽磨蚀较重 ,但仍可看出原尖前脊和原尖后脊分别伸向前尖和后尖的前、后基部。前附尖很发育 ,突出在牙齿的前外角。前尖虽已部分破损 ,但从保留的部分看相当大 ,明显大于后尖。牙齿长 3.75mm ,宽 4.25mm。

下颌骨比较粗壮。下颊齿齿冠高 ,单面高冠明显 ,齿冠唇、舌两面釉质均进入齿槽缘。V 11360.5 保存的 p4~m2 磨蚀深 ,冠面上只见两个横宽呈椭圆形的三角座和跟座。p4 的三 角座和跟座近于等长 ,而两个下臼齿的跟座均略长于三角座。V 11360.4标本上的p4

表 3　麻姑宣南兽的下颊齿测量与比较

Table 3　Measurements and comparison of the lower cheek teeth of Hsiuannania maguensis　(mm)

	dp4			p4			m1			m2		
	长 (L)	三角座宽 (TrW)	跟座宽 (TaW)	长 (L)	三角座宽 (TrW)	跟座宽 (TaW)	长 (L)	三角座宽 (TrW)	跟座宽 (TaW)	长 (L)	三角座宽 (TrW)	跟座宽 (TaW)
V 11360.2	4.25	2.40	2.45									
V 11360.4				3.70	2.75	2.90						
V 11360.5				4.10	3.10	3.25	4.00	3.30	3.50	4.75	3.75	4.00
V 4314	4.25	3.30	3.30									
V 4276				3.50	3.25	3.10	4.10	3.45	3.25	4.60	3.30	3.50

注: 1) V 4314 为宣南兽未定种(*Hsiuannania* sp.) 材料(徐钦琦 ,1976) 。

2) V 4276 为麻姑宣南兽(*Hsiuannania maguensis*) 的正型标本。

3) 数据均为本文作者所测。

刚萌出,未经磨蚀,因而可代表这个种下臼齿的形态。三角座上只有下原尖和下后尖,大小及高低程度相近,内外对峙,无下前尖。有微弱的下后脊 II。牙齿前壁凹入,但愈近基部凹入程度愈轻。三角座后壁陡直。跟座盆形,在下内尖前接近三角座处向舌侧开口。下内尖和下次尖都很大,下次小尖微弱。斜脊与下原尖后侧基部相接,比较靠外。牙齿测量与比较见表 3。

两个 dp4 的大小、形态及磨蚀程度完全相同,可认为是同一年轻个体。齿冠相对恒齿显得低。下后尖最粗大高耸,下原尖次之。下前尖也非常发育,位于下后尖的前方略偏内。由于下前尖的存在致使三角座呈横宽的三角形。下后脊与下前脊均很细弱,后者自下原尖前侧向前再向内与下前尖相接,致使两脊多少呈 U 形。三角凹较深,并在下后尖与下前尖之间向舌侧开口。牙齿前侧有齿带。跟座比三角座略低,呈盆形,三个尖都很发育,之间有切迹,下次小尖比较靠近下内尖。斜脊连于三角座后壁中部的基部。这个乳齿与 V 11360.4 的 p4 不同在于:1) 有发育的下前尖和下次小尖;2) 斜脊比较靠内。徐钦琦(1976)曾记述过 *Hsiuannania* sp.,标本为带 dp3 和 dp4 的下颌骨,由于磨蚀重,尖脊已无法区分,难以与本文记述的 dp4 相比。

从上面记述的材料看,上、下颊齿均单面高冠,下颊齿齿冠高,唇、舌侧釉质均进入齿槽缘,与麻姑宣南兽一致,大小也相近(表 3),因此可视为同种。

钝脚目　**Pantodonta Cope,1873**

全棱齿兽科　**Pantolambdodontidae Granger et Gregory,1934**

古脊齿兽属　*Archaeolambda* **Flerov,1952**

古脊齿兽未定种　*Archaeolambda* **sp.**

(图 2 - 6)

标本为一右下颌骨残段带颊齿 m1 及齿冠破碎的 p4 和 m2(V 12663)。颌骨体在 m1 之下唇、舌面深分别为 15.8 和 17.5mm。m1 的三角座和跟座均呈 V 形,夹角近等(约 60°),两者形态相似,只是后者比前者低小得多。牙齿不单面高冠,看不出有下后附尖。因此虽未见到 m3 的圆形跟座,根据上述特点仍可把它放在古脊齿兽属中(黄学诗,1995)。牙齿长 10mm,宽 6.5mm。个体比大别种(*A. tabiensis*)和扬子种(*A. yangtzeensis*)大,而与 *A. planicanina* 接近或稍小(黄学诗,1978)。黄学诗和郑家坚(1997)曾记述过发现在宣城盆地双塔寺组中的扬子古脊齿兽相似种的下臼齿三角座(V 11352.2),大小与本文记述的标本接近。因为没有其他材料可供对比,故很难定种。这块化石是在室内修理嘉山中国中兽时从围岩中修出的。

翼齿兽科　**Harpyodidae Wang,1979**

翼齿兽属　*Harpyodus* **Qiu et Li,1977**

进步翼齿兽　*Harpyodus progressus* **Huang et Zheng,1997**

(图 2 - 5)

标本为一左上颌骨带颊齿 P4～M1 及齿冠破损的 P3(V 12664)。P3 齿冠已破损,从残留部分看,似呈等腰三角形,宽稍大于长。P4 也呈等腰三角形,比 P3 横宽,冠面由原尖前、后脊和外脊组成叠双 V 形脊,外脊夹角略大于原尖脊夹角,约为 60°。原尖前脊和后脊均比外脊低矮得多,分别伸向前附尖和后附尖。前小尖不明显,后小尖特别小。前、后、

外齿带低而微弱,无内齿带。M1 成横宽的矩形,外脊成极弱的 W 形,向内伸达牙齿宽度

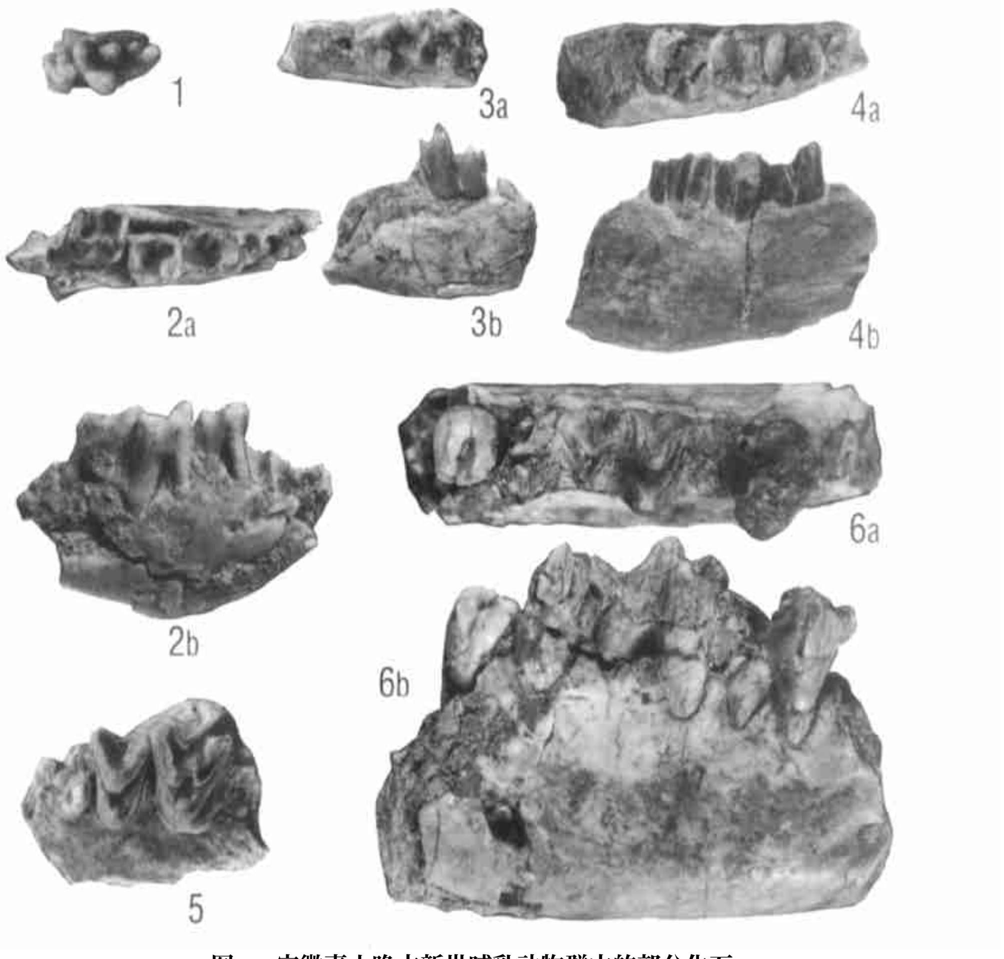

图 2　安徽嘉山晚古新世哺乳动物群中的部分化石

Fig. 2　Late Paleocene mammals (part) of Jiashan, Anhui

1. **翟氏肉齿兽?(新种)的左** m2 **和** m1 **的跟座**(left m2 and talonid of m1 of *Sarcodon ? zhaii* sp. nov.), V 11358, **冠面观**(crown view), ×4

2. **馍鼠兔未定种的右下颌骨附颊齿** p3~m2(right lower jaw with p3~m2 of *Mimotona* sp.), V 11359, ×4

2a. **冠面观**(crown view); 2b. **唇面观**(labial view)

3~4. **麻姑宣南兽**(*Hsiunnania maguensis*), ×2

3. **左下颌骨带** dp4 (partial left lower jaw with dp4), V 11360.2

3a. **冠面观**(crown view); 3b. **唇面观**(labial view)

4. **右下颌骨附颊齿** p4~m2(partial right lower jaw with p4~m2), V 11360.5

4a. **冠面观**(crown view); 4b. **唇面观**(labial view)

5. **进步翼齿兽的左上颌骨带颊齿** P4~M1 **及齿冠破碎的** P3(left upper jaw with P4~M1 and broken P3 of *Harpyodus progressus*), V 12664, **冠面观**(crown view), ×2

6. **古脊齿兽未定种的右下颌骨带** m1 **及齿冠破碎的** p4 **和** m2(right lower jaw with m1 and broken p4 and m2 of *Archaeolambda* sp.), V 12663 ×2

6a. **冠面观**(crown view); 6b. **唇面观**(labial view)

之半。无中附尖。和 P4 一样,原尖前脊和后脊分别伸达牙齿的前附尖和后附尖基部。但前小尖和后小尖比在前臼齿中明显。前、后齿带很发育,虽低但宽,致使内壁较宽,牙齿近矩形或梯形。内齿带也很发育,但在原尖内侧中断。外侧由齿带形成的柱尖高而大,磨蚀后呈新月形脊,封闭外凹。牙齿测量见表 4。

表 4　进步翼齿兽的上颊齿(V 12664)测量

Table 4　Measurements of the upper cheek teeth (V 12664) of *Harpyodus progressus*　(mm)

		P4	M1	P4~M1
长(L)		4.3	5.8	10.0
宽(W)	沿前缘(aam)	6.0	6.6	
	沿后缘(apm)	6.0	7.8	
宽(前缘)/长 ×100		140	103	

注:aam = along anterior margin;apm = along posterior margin.

除了个体稍大、P4 原尖前脊伸得长外,V 12664 标本的上颊齿在齿冠形态、尖脊结构、齿带发育程度等方面均与发现于宣城的进步翼齿兽(黄学诗和郑家坚,1997)一致,因此可视为同种。

北柱兽目　Arctostylopida Cifelli et al.,1989

北柱兽科　Arctostylopidae Schlosser,1923

皖柱兽属　*Wanostylops* Huang et Zheng,1997

原始皖柱兽(新种)　*Wanostylops promissus* sp. nov.

(图 3;4 - 3~4)

正型标本　残破的左上颌骨带颊齿 P4~M3 及 P3 的后外部(V 12666)。

归入标本　左下颌骨残段附 m1 及 m2 的三角座(V 12666.1)。

产地及层位　安徽省嘉山县辛庄南 1km,晚古新世土金山组。

特征　一种个体比杨氏皖柱兽(*Wanostylops youngi*)稍小、特征较原始的皖柱兽。上臼齿前、后尖和前、后附尖在外脊上均清楚可见,原尖舌侧两个尖状釉质突起仅在 M1 中为

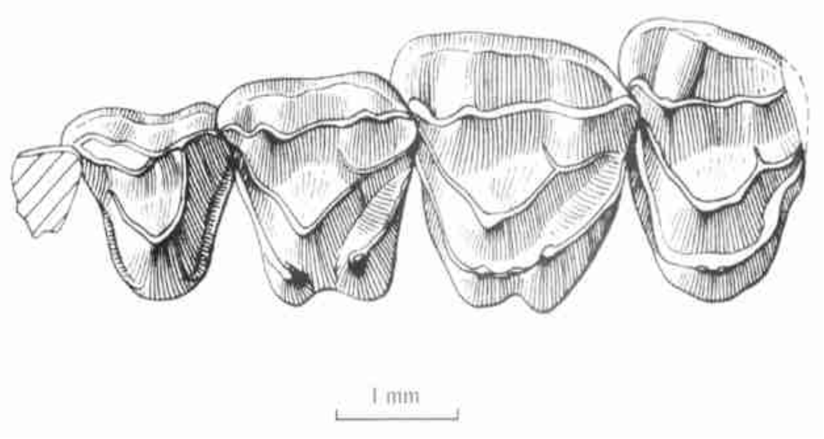

图 3　原始皖柱兽(新种)的左上颌骨带颊齿 P4~M3 及 P3 的后外部(V 12666)

Fig. 3　Left upper jaw with P4~M3 and posteroexternal part of P3 (V 12666) of *Wanostylops promissus* sp. nov.

孤立状,在M2中为内侧齿带所连,M3中此两突起十分小。

描述 上颊齿紧密排列无齿隙。外齿带不太发育,位置低,在M2中较明显。前、后齿带很发育,成低脊状。前小尖很发育,并从P4到M3逐渐增大。P4近等边三角形,外壁较平,只在中部略向内凹。外脊不平直,中间高两边低。原尖V形。原尖前脊和后脊分别与前附尖和后尖相连。脊状前、后齿带在原尖内侧不相连。上臼齿外壁在前尖和前附尖处有两个向外凸的小纵肋。外壁在中部略向内凹。外脊高低不平,在前、后尖处高凸,在中间及两侧低平。除前、后尖外,前、后附尖在外壁上也清楚可辨。无次尖,原尖V形。原脊比后脊高,与前附尖相连。后脊在外侧分两支,一支连于后尖前侧,另一支则与后壁外侧相连。M1和M2成次方形或梯形,内侧两个釉质突起小,低于原尖。在M1中两个突起虽孤立,但牙齿内侧纵沟不明显,在M2中则被内齿带完全相连,在M3中类似M2,但显得小,在内齿带上勉强可以辨认。M2是最大的上颊齿,M3比M1横宽,冠面近矩形。

下颌骨在m1处唇、舌面分别深5.5和5.8mm。m1三角座已破损,但仍可看出不退化。下内尖圆锥状。下内尖脊低,连下外脊基部,不横直,略呈前外后内向。外中沟较深。m2的三角座呈V形,下原尖与下后尖等高,下前尖低小,下前脊短,长度为下后脊之半。牙齿测量见表5。

表5 原始皖柱兽(新种)的上颊齿(V 12666)和下颊齿(V 12666.1)测量

Table 5 Measurements of the upper (V 12666) and lower (V 12666.1) cheek teeth of *Wanostylops promissus* **sp. nov.** (mm)

	P4	M1	M2	M3	P4~M3	P4~M2	P4~M1	M1~M3	M1~M2	M2~M3	m1
长(L)	2.2	2.8	3.2	2.6	10.3	8.2	4.9	8.2	5.8	5.7	3.1
宽(W)	2.2	2.6	3.5	3.5							1.6

比较与讨论 从V 12666号标本的上臼齿看,它们的原脊与前附尖相连,而后脊分两支,分别连于后尖和牙齿的后壁外侧,有发育程度不同的位于原尖内侧的釉质突起。这些特点都与杨氏皖柱兽(黄学诗和郑家坚,1997)一致,毫无疑问它应该属于皖柱兽属。但嘉山的标本与在宣城发现的杨氏皖柱兽仍有很大差别,这主要表现在:上颊齿外脊高低不平,前、后尖和前、后附尖都可在外脊上辨认出来;而杨氏种外脊在前尖后平直,后尖特别是后附尖在外脊上表现不清楚。前者上臼齿原尖内侧的两个釉质突起比较小,尤其在M3上,且原尖内侧无纵沟。此外,嘉山标本的个体也比宣城的小。上述不同点完全能把它们区分开来,而且这些不同点正反映了这两个种在特征上原始(或保守)和进步(或特化)的差异,故我们命名嘉山标本所代表的动物为原始皖柱兽。

沟柱兽属 *Bothriostylops* **Zheng et Huang, 1986**

进步沟柱兽 *Bothriostylops progressus* **(Tang et Yan), 1976**

(图4-1~2)

材料为一左下颌骨附完整的p4、齿冠稍破损的m3及m2的跟座,其余牙齿只保留齿根(V 12665.1);和一左下颌骨断块带有完整的m3(V 12665.2)。下颌骨粗壮,底缘微微突起,最突处在m2之下。颏孔位于p1和p2之间颌骨体中部。下颌联合后部达p2前缘。下颌上升支起于m3之后,但从外侧面看并不遮盖这个牙齿。水平支在m3之后上升支之

下有收缩。下颌骨测量见表 6。

表 6　进步沟柱兽的下颌骨(V 12665. 1) 深度测量

Table 6　Measurements of depth of the horizontal part of mandibular ramus

(V 12665. 1) of Bothriostylops progressus　(mm)

p2 之下 (below p2)		m2 之下 (below m2)		m3 之下 (below m3)	
唇侧(la)	舌侧(li)	唇侧(la)	舌侧(li)	唇侧(la)	舌侧(li)
5.5	5.9	7.5	8.2	7.5	8.2

注:la = labial ;li = lingual.

保存的 p4 和 m3 以及 m2 的跟座均与以往发现的进步沟柱兽相应的下颊齿(汤英俊和阎德发,1976;郑家坚和黄学诗,1986;黄学诗和陈烈祖,1997)无异,只是 m3 在比例上稍大些。下颊齿测量见表 7。

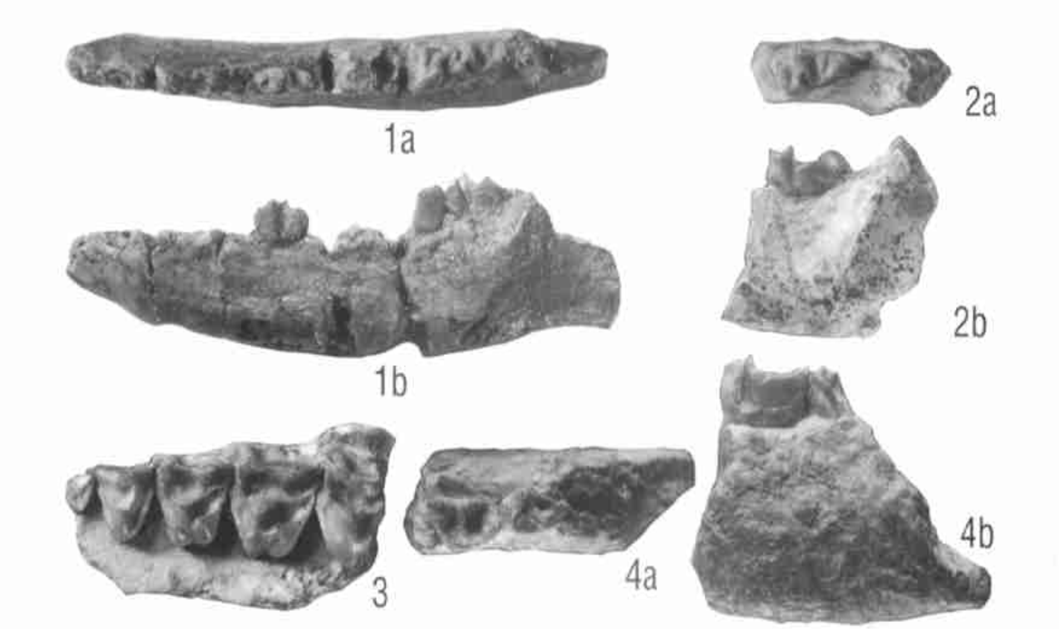

图 4　安徽嘉山晚古新世哺乳动物群中的北柱兽类化石

Fig. 4　Arctostylopid remains of the Late Paleocene Jiashan Fauna, Anhui

1~2. 进步沟柱兽(*Bothriostylops progressus*), ×2

1. 左下颌骨附 p4 及齿冠破碎的 m3 和 m2 跟座(left lower jaw with m1, broken m3 and talonid of m2), V 12665. 1

1a. 冠面观(crown view); 1b. 唇面观(labial view)

2. 左下颌骨残段带颊齿 m3(partial left lower jaw with m3), V 12665. 2

2a. 冠面观(crown view); 2b. 唇面观(labial view)

3~4. 原始皖柱兽(新种)(*Wanostylops promissus* sp. nov.), ×4

3. 左上颌骨带颊齿 P4~M3 及 P3 的后外部(left upper jaw with P4~M3 and posteroexternal part of P3), V 12666, 冠面观(crown view)

4. 左下颌骨残段附 m1 及 m2 的三角座(partial left lower jaw with m1 and trigonid of m2), V 12666. 1

4a. 冠面观(crown view); 4b. 唇面观(labial view)

表 7 进步沟柱兽的下颊齿(V 12665. 1 和 V 12665. 2) 测量

Table 7 Measurements of the lower cheek teeth (V 12665. 1 and V 12665. 2) of Bothriostylops progressus

(mm)

	p4		m3	
	长(length)	宽(width)	长(length)	宽(width)
V 12665. 1	4. 0	1. 6		
V 12665. 2			5. 4	2. 5

2 动物群性质和含化石层时代讨论

在嘉山土金山地区发现的哺乳动物化石,已报道过的有嘉山中国中兽(*Sinonyx jiashanensis*) (Zhou et al. ,1995) 和翟氏中国臼兽(*Sinomylus zhaii*) (McKenna and Meng ,2001) 。它们均为新属新种,对于地层时代,作者未作过多讨论。周晓元等(1995) 只根据野外鉴定的初步化石名单,认为是晚古新世,相当于潜山盆地痘姆组的时代。

本文记述的 7 种化石中有两个新种。原始皖柱兽在特征上似比发现在宣城盆地双塔寺组中的杨氏皖柱兽原始。翟氏肉齿兽 ? 与发现在蒙古晚古新世格沙头组中的 *Sarcodon pygmaeus* 相比,很难判定谁原始或进步。僕鼠兔未定种的下颊齿在长度上与发现在潜山盆地痘姆组中的粗壮僕鼠兔很接近。古脊齿兽未定种的下颊齿在大小上与在宣城盆地双塔寺组中曾发现过的扬子古脊齿兽相似种很相近。其余 3 个种,进步翼齿兽、进步沟柱兽和麻姑宣南兽都在宣城盆地双塔寺组中发现过。这说明了土金山动物群与双塔寺动物群有惊人的相似。但由于有僕鼠兔未定种和原始皖柱兽的存在,所以土金山动物群的时代虽为晚古新世,有可能相当于双塔寺动物群(格沙头期) ,但不是没有稍早的可能。

致谢 翟人杰教授慷慨将标本转交作者研究,张弥曼院士和吴文裕教授帮助修改英文摘要,张杰和杨明婉高级工程师帮助制作插图,作者在此一并表示衷心感谢。

MAMMALIAN REMAINS FROM THE LATE PALEOCENE OF JIASHAN, ANHUI

HUANG Xue-Shi

(Institute of Vertebrate Paleontology and Paleoanthropology , Chinese Academy of Sciences Beijing 100044*)*

Key words Jiashan ,Anhui ,Late Paleocene ,mammals

Summary

The IVPP and Anhui Provincial Geological Bureau joint team had made several times of paleontological investigation in Tujinshan Area , Jiashan County , Anhui Province since 1970 's , resulting in finding a relatively rich Paleogene mammalian fauna. Apart from *Sinonyx jiashanensis*

(Zhou et al.,1995) and *Sinomylus zhaii* (Mckenna and Meng,2000), seven species belonging to five orders of Mammalia are described in the present paper, which not only increase the faunal content but also provide important evidence for the geological age of the fossil-bearing bed.

1 Systematic paleontology

Soricomorpha Gregory, 1910

Micropternodontidae Stirton et Rensberger, 1964

Sarcodon **Matthew et Granger, 1925**

Sarcodon ? zhaii **sp. nov.**

(Fig. 1; 2 - 1)

Type A left lower jaw with m2 and talonid of m1 (V 11358).

Locality and horizon 1 km south to Xinzhuang Village, Jiashan County, Anhui Province; Late Paleocene Tujinshan Formation.

Diagnosis A species of *Sarcodon* that differs from *S. pygmaeus* in having narrow talonid on lower molars.

Etymology In honor of Professor Zhai Renjie who made great contribution to the stratigraphy and paleontology in Jiashan Area.

Description The hypoconulid in m1 is situated in the middle of the tooth transversely. The distances from hypoconulid to both hypoconid and to entoconid are somewhat shorter than that from the hypoconid to entoconid. The talonid basin opens lingually in front of the entoconid. m2 is well preserved. The trigonid bears the usual three cusps, of which the protoconid is the highest. The paraconid is somewhat blade-like and projects lingually from the anterior base of the protoconid. There are distinct notches between the protoconid and paraconid and between protoconid and metaconid. Three cusps on the talonid are pronounced, of which the hypoconulid is the highest. In contrast to that in m1, the distance from hypoconid to entoconid is shorter than that from hypoconulid both to hypoconid and to entoconid.

Remarks The complete tooth described above has large and high hypoconulid, and the distance between the cusps on the talonid is different from that in the tooth anterior to the complete one. So the complete tooth must be the last lower molar. This tooth is most similar to m2 of *Sarcodon* and *Prosarcodon* in morphology. Each of the last two genera has only two lower molars, so the complete tooth is most probably m2. The specimen described may belong to *Sarcodon* since Jiashan's m2 is larger than that of *Prosarcodon* (Table 1), but differs from *S. pygmaeus*, the only known species of the genus, in having narrow talonids of lower molars (Table 1). Hence, the specimen is referred to a new species of *Sarcodon* with reservation.

Mimotonida Li et al., 1987

Mimotonidae Li, 1977

Mimotona **Li, 1977**

Momotona **sp.**

(Fig. 2 - 2)

The material is a fragmentary right lower jaw with heavily worn p4~m2, broken il, and the alveoli of i2 and p3 (V 11359). A large mental foramen is situated below the trigonid of p4. The first incisor is remained only in the alveolus. The p4 and two lower molars can not provide any information because they are heavily worn.

Anagalida Szalay et McKenna, 1971

Anagalidae Simpson, 1931

Hsiuannania **Xu, 1976**

Hsiuannania maguensis **Xu, 1976**

(Fig. 2 - 3~4)

Material A fragmentary upper jaw with M2 and broken M1 (V 11360.1); A pair of lower jaws with dp4s (V 11360.2~3); a right lower jaw with p4 (V 11360.4) and a right lower jaw with p4~m2 (V 11360.5).

Description M2 is round-quadrate in outline and distinctly unilaterally hypsodont, with well-developed anterior and posterior cingula. Pre- and postprotocrista extend to the base of paracone and metacone respectively. The paracone is obviously larger than metacone though it was somewhat damaged. The tooth is heavily worn.

The mandible is robust. The lower cheek teeth are unilaterally hypsodont, with high crown in which partial enamel enters the alveolus. p4~m2 on V 11360.5 are heavily worn, both trigonid and talonid are elliptic in shape. The p4 on V 11360.4 is slightly worn. Its trigonid consists of protoconid and metaconid, and a weak metalophid II, with somewhat concave anterior wall. The talonid is basin-like, opens lingually in front of the entoconid. Both the hypoconid and entoconid are large. The hypoconulid is weak but distinct. The cristid obliqua connects posterior base of the protoconid.

dp4 differs from p4 in having distinct paraconid and hypoconulid, and more internally situated cristid obliqua.

Remarks The cheek teeth described above are unilaterally hypsodont. The crown of the lower cheek teeth is high and the enamel of the teeth partially enters the alveolus on both sides. So these teeth undoubtedly belong to *Hsiuannania maguensis*.

Pantodonta Cope, 1873

Pantolambdodontidae Granger et Gregory, 1934

Archaeolambda **Flerov, 1952**

Archaeolambda **sp.**

(Fig. 2 - 6)

The material is a right lower jaw with m1, broken p4 and m2 (V 12663). Both trigonid and talonid of m1 are V-shaped, with nearly equal angle (about 60°), but the former is bigger and higher than the latter. This tooth most probably belongs to *Archaeolambda*. It is larger than the m1 of both *A. dabiensis* and *A. yangtzeensis* but a little smaller than that of *A. planicanina*, and is close to *Archaeolambda* cf. *A. yangtzeensis* found in Xuancheng Basin (Huang and Zheng, 1997) in size. It is hard to determine which species it should belong to because of poor preservation.

Harpyodidae Wang, 1979

Harpyodus **Qiu et Li, 1977**

Harpyodus progressus **Huang et Zheng, 1997**

(Fig. 2 - 5)

This species is represented by a fragmentary left upper jaw with P4~M1 and broken P3 (V 12664). P3 seems isosceles triangular in outline seen from the remained part of crown. P4 is in the same shape as P3, but wider. Both joint pre- and postprotocrista and ectoloph are V-shaped. Pre- and postprotocrista are lower than ectoloph, extending to parastyle and metastyle, respectively. The metaconule is small and the paraconule is indistinct. M1 is nearly rectangular in outline, wider than long. The ectoloph is weak W-shaped, extending inward to the middle part of the tooth. There is no mesostyle. The pre- and postprotocrista link the base of parastyle and metastyle respectively as in P4. Both paraconule and metaconule are more distinct than in P4. The anterior and posterior cingula are low but wide. The internal cingulum is also developed but interrupted on inner side of the protocone. The stylocone formed by the external cingulum is large.

Except for slightly larger size, the upper cheek teeth described above are similar to those of *Harpyodus progressus* found in Xuancheng Basin in tooth morphology.

Arctostylopida Cifelli et al., 1989

Arctostylopidae Schlosser, 1923

Bothriostylops **Zheng et Huang, 1986**

Bothriostylops progressus **(Tang et Yan), 1976**

(Fig. 4 - 1~2)

The referred specimens are a left lower jaw with p4, broken m3 and talonid of m2 (V 12665.1), and a left lower jaw with m3 (V 12665.2). The horizontal ramus is robust, with slightly convex lower margin. Mental foramen occurs between p1 and p2, about halfway between the ventral and alveolar border. The anterior end of the lower jaw (V 12665.1) possesses an unfused symphysis, which is prolonged anterior to p2. Except that m3 is a little bigger in proportion, p4 and m3 as well as talonid of m2 are similar to the previously known *Bothriostylops progressus* specimens in morphology.

Wanostylops **Huang et Zheng, 1997**

Wanostylops promissus **sp. nov.**

(Fig. 3; 4 - 3~4)

Type A fragmentary left upper jaw with P4~M3 and posteroexternal part of P3 (V 12666).

Other material A left lower jaw with m1 and trigonid of m2 (V 12666.1).

Locality and horizon As for *Sarcodon ? zhaii*.

Diagnosis A species smaller and more primitive than *Wanostylops youngi*. Paracone, metacone, parastyle and metastyle on ectoloph are more distinct. Two tuber-like cingulum cusps are isolated on M1, but are much smaller and connecting together by cingulum on M2 and M3.

Description Upper cheek teeth arrange closely. Anterior and posterior cingula are well-developed and low-crestlike. Paraconule is also very developed, increasing in size from P4 to M2. P4 is nearly equilateral triangular in shape. The ectoloph is not straight, but high at the middle. The pre- and postprotocrista connect the parastyle and metacone, respectively. The upper molars are slightly convex outward at paracone and parastyle. The external wall is somewhat concave inward at the middle. The ectoloph is high at paracone and metacone. The paracone, metacone, parastyle and metastyle can be seen on the ectoloph. There is no hypocone. The preprotocrista links the parastyle, being higher than the posterior one. The postprotocrista divides into two crests at its out part: one connects anterior base of metacone, the other links outer part of the posterior wall. Both M1 and M2 are subquadrate or trapezoid in outline. Two tuber-like cingulum cusps are relatively small, isolated on M1, connecting together by cingulum on M2 and M3, but much smaller on M3. M3 is nearly rectangular in shape, wider than M1. M2 is the largest of the upper cheek teeth.

The trigonid of m1 is not reduced. The entoconid is cone-like. The entocristid is low, and links the base of the ectoloph, extends slightly in anteroexternal-posterointernal direction. The median external groove is relatively deep.

Comparison and discussion The upper molars have tuber-like cingulum cusps on the inner side. The preprotocrista connects parastyle. The postprotocrista divides into two crests at outer part. All the above features indicate they should belong to *Wanostylops*. It differs from *W. youngi* in smaller size and in having an ectoloph on which all the external cusps can be seen, tuber-like cingulum cusps are smaller, vertical groove on the inner side of the protocone is absent. These differences might indicate that the new species is more primitive or conservative than *W. youngi*.

2 The age of the fossil-bearing bed

Two taxa, *Sinonyx jiashanensis* and *Sinomylus zhaii*, have been reported by previous authors from Tujinshan, Jiashan County, Anhui Province (Zhou et al., 1995; McKenna and Meng, 2001).

They have not discussed the age of fossil-bearing bed in detail. Zhou et al. (1995) thought it was late Paleocene, equivalent to Doumu Fauna of Qianshan Basin based only on the preliminary faunal list.

Seven species are described in the present paper, among which two are new. *Wanostylops promissus* is more primitive than *W. youngi* found in Shuangtasi Formation of Xuancheng Basin. Compared with *Sarcodon ? zhaii* sp. nov. and *S. pygmaeus* found from the Late Paleocene Gashato Formation of Mongolia it is hard to determine which one is more primitive or more progress at evolutionary level. The length of cheek teeth of *Mimotona* sp. is close to that of *M. robusta* found in the Late Paleocene Doumu Formation of Qianshan Basin. *Archaeolambda* sp. is close to *Archaeolambda* cf. *A. yangtzeensis* found in Shuangtasi Formation of Xuancheng Basin in size (V 11352.2, Huang and Zheng, 1997). The remained three species, *Harpyodus progressus*, *Bothriostylops progressus*, and *Hsiannania maguensis*, are all found in the Late Paleocene Shuangtasi Formation. So Tujinshan Fauna is of Late Paleocene, and may be equivalent to Shuangtasi Fauna (Gashatan) or a little earlier in age.

References

Huang X S (黄学诗), 1978. Paleocene Pantodonta of Anhui. Vert PalAsiat (古脊椎动物学报), **16**(4): 275~281 (in Chinese)

Huang X S (黄学诗), 1995. Classification of Pantolambdodontidae (Pantodonta, Mammalia). Vert PalAsiat (古脊椎动物学报), **33**(3): 194~215 (in Chinese with English summary)

Huang X S (黄学诗), Chen L Z (陈烈祖), 1997. Mammalian remains from the Late Paleocene of Guichi, Anhui. Vert PalAsiat (古脊椎动物学报), **35**(1): 49~67 (in Chinese with English summary)

Huang X S (黄学诗), Zheng J J (郑家坚), 1997. Early Tertiary mammals of Xuancheng Basin, Anhui Province and its implication for the age of Shuangtasi Formation. Vert PalAsiat (古脊椎动物学报), **35**(4): 290~306 (in Chinese with English summary)

Li C K (李传夔), 1977. Paleocene eurymyloids (Anagalida, Mammalia) of Qianshan, Anhui. Vert PalAsiat (古脊椎动物学报), **15**(2): 103~118 (in Chinese with English abstract)

Li C K, Wilson R W, Dawson M R et al., 1987. The origin of rodents and lagomorphs. Curr Mammal, **1**: 97~108

McKenna M C, Meng J, 2001. A primitive relative of rodents from Chinese Paleocene. J Vert Paleont, **21**(3): 565~572

McKenna M C, Xue X X, Zhou M Z, 1984. *Prosarcodon lonanensis*, a new Paleocene micropternodontid palaeoryctoid insectivore from Asia. Am Mus Novit, (2780): 1~17

Szalay F S, McKenna M C, 1971. Beginning of the age of the mammals in Asia: the late Paleocene Gashato Fauna, Mongolia. Bull Am Mus Nat Hist, **144**(4): 269~318

Tang Y J (汤英俊), Yan D F (阎德发), 1976. Note on some mammalian fossils from the Paleocene of Qianshan and Xuancheng, Anhui. Vert PalAsiat (古脊椎动物学报), **14**(2): 91~99 (in Chinese)

Xu Q Q (徐钦琦), 1976. New materials of Anagalidae from the Paleocene of Anhui (A). Vert PalAsiat (古脊椎动物学报), **14**(3): 174~184 (in Chinese)

Zheng J J (郑家坚), Huang X S (黄学诗), 1986. New arctostylopids (Notoungulata, Mammalia) from the Late Paleocene of Jiangxi. Vert PalAsiat (古脊椎动物学报), **24**(2): 121~128 (in Chinese with English summary)

Zhou X Y, Zhai R J, Gingrich P D et al., 1995. Skull of a new mesonychid (Mammalia, Mesonychia) from the Late Paleocene of China. J Vert Paleont, **15**(2): 387~400